

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

Claim 1 (Currently Amended): A method comprising:

establishing a peering session between a first device associated with a first customer network and a second device associated with a second customer network using a first routing protocol;

establishing a label switched path (LSP) through a plurality of intermediate networks communicatively coupled between the first customer network and the second customer network;

after establishing the peering session and the LSP, outputting by the first device routing communications over the peering session in accordance with the first routing protocol, the routing communications including communicating layer two (L2) service information comprising Media Access Control (MAC) address state information for devices in the first customer network, over the peering session using the first routing protocol between the first device associated with the first customer network and the second device associated with the second customer network, wherein communicating the L2 service information using the first routing protocol comprises the first device outputting routing communications in accordance with the first routing protocol, wherein the routing communications include the L2 service information, and wherein the L2 service information comprises Media Access Control (MAC) address state information for devices in the first customer network, wherein the first device continuously outputs the routing communications as the MAC address state information is learned by the first device; and

providing an L2 service in accordance with the L2 service information to transport L2 communications between the first customer network and the second customer network through the plurality of intermediate networks using the LSP.

Claim 2 (Previously Presented): The method of claim 1, wherein establishing an LSP comprises exchanging label information associated with the LSP between the plurality of intermediate networks using a second routing protocol that has been extended to distribute the label information.

Claim 3 (Original): The method of claim 2, wherein the second routing protocol carries the label information in association with routes advertised between the intermediate networks.

Claim 4 (Original): The method of claim 2, wherein the second routing protocol carries the label information as network layer reachability information (NLRI) that is associated with a route advertised between the first customer network and the second customer network.

Claim 5 (Original): The method of claim 2, wherein the second routing protocol comprises the Border Gateway Protocol (BGP).

Claim 6 (Original): The method of claim 2, wherein the label information conforms to one of Multi-protocol Label Switching (MPLS) or the Label Distribution Protocol (LDP).

Claim 7 (Original): The method of claim 2, wherein the first routing protocol is the same as the second routing protocol.

Claim 8 (Previously Presented): The method of claim 1, wherein communicating the L2 service information using the first routing protocol comprises communicating the L2 service information between the first device and the second device using an exterior routing protocol.

Claim 9 (Original): The method of claim 8,

wherein communicating L2 service information comprises communicating the L2 service information using an intermediate route relay device,

wherein the L2 service information includes information for L2 sites or end-points within the second customer network and next hop information used to reach these L2 sites or end-points from the first customer network, and

wherein the method includes configuring the intermediate route relay device to maintain and relay the next hop information unchanged via the exterior routing protocol.

Claim 10 (Previously Presented): The method of claim 1, wherein the L2 service comprises the Virtual Private LAN Service and the L2 communications comprise Ethernet communications, and wherein at least one of the plurality of intermediate networks does not support the Virtual Private LAN Service.

Claim 11 (Previously Presented): The method of claim 2, wherein providing an L2 service comprises:

receiving L2 communications from the first customer network; and

assigning labels to the L2 communications from the first customer network in accordance with the label information to form packets for transporting the L2 communications from the first customer network to the second customer network.

Claim 12 (Currently Amended): A device comprising:

one or more interface cards configured to communicate packets via input links and output links;

a routing process that receives, via packets received by the one or more interface cards, label information for a label switched path (LSP) through a plurality of intermediate networks communicatively coupled between a first customer network and a second customer network; ~~wherein the routing process receives the label information from packets received by the one or more interface cards; and~~

a first routing protocol that executes on a control unit of the device, establishes a peering session between the device and a second device associated with the second customer network, and receives ~~layer two (L2) service information associated with the second customer network by receiving~~ a routing communication over the peering session that includes ~~the layer two (L2) service information associated with the second customer network,~~ wherein the L2 service information comprises Media Access Control (MAC) address state information for devices in the second ~~first~~ customer network, wherein the ~~first routing protocol~~ control unit processes the L2 service information in accordance with the first routing protocol by injecting the L2 service information into stored route information and resolving the route information to associate routes associated with the injected L2 service information with respective next-hops; and

an L2 service that operates in accordance with the L2 service information and transports L2 communications between the first customer network and the second customer network through the plurality of intermediate networks in accordance with the label information by outputting the L2 communications via the output links of the one or more interface cards.

Claim 13 (Previously Presented): The device of claim 12, wherein the routing process receives the label information through the plurality of intermediate networks via a second routing protocol that has been extended to distribute the label information.

Claim 14 (Previously Presented): The device of claim 13, wherein the second routing protocol carries the label information in association with routes advertised between the plurality of intermediate networks.

Claim 15 (Original): The device of claim 13, wherein the second routing protocol carries the label information as network layer reachability information (NLRI) that is associated with a route advertised between the first customer network and the second customer network.

Claim 16 (Original): The device of claim 13, wherein the second routing protocol comprises the Border Gateway Protocol (BGP).

Claim 17 (Previously Presented): The device of claim 13, wherein the first routing protocol is the same as the second routing protocol.

Claim 18 (Original): The device of claim 12, wherein the label information conforms to one of Multi-protocol Label Switching (MPLS) or the Label Distribution Protocol (LDP).

Claim 19 (Previously Presented): The device of claim 12, wherein the device receives the L2 service information from the second device associated with the second customer network via an exterior routing protocol.

Claim 20 (Original): The device of claim 19,
wherein the L2 service information includes information for L2 sites or end-points in the second customer network and next hop information used by the device to reach these remote L2 sites or end-points, and
wherein the device is configured relay the next hop information unchanged using the exterior routing protocol when the device receives the L2 service information and the next hop information via an intermediate route relay device.

Claim 21 (Previously Presented): The device of claim 12, wherein the L2 service comprises the Virtual Private LAN service (VPLS) and the L2 communication comprise Ethernet communications and wherein at least one of the plurality of intermediate networks does not support the Virtual Private LAN Service.

Claim 22 (Previously Presented): The device of claim 12, wherein the L2 service receives L2 communications from the first customer network, and assigns labels to the L2 communications from the first customer network in accordance with the label information to form packets for transporting the L2 communications from the first customer network to the second customer network through the plurality of intermediate networks via the LSP.

Claim 23 (Original): The device of claim 12, wherein the device comprises a provider edge router or a customer edge router.

Claim 24 (Currently Amended): A system comprising:

a border router that establishes a label switched path (LSP) through a plurality of intermediate networks, wherein the LSP communicatively couples a first customer network and a second customer network;

a first route reflector associated with the first customer network that establishes a peering session between the first route reflector and a second route reflector associated with ~~[[a]]~~ the second customer network using an exterior routing protocol, and communicates ~~layer two (L2) service information~~ with the second route reflector associated with the second customer network via routing communications that conform to the exterior routing protocol, ~~wherein the routing communications and that include the L2 service information, and wherein the L2~~ layer two (L2) service information that comprises Media Access Control (MAC) address state information for devices in the first customer network, and wherein the first route reflector continuously outputs the routing communications as the MAC address state information is learned by the first route reflector; and

an edge router that provides an L2 service to the first customer network in accordance with the L2 service information to transport L2 communications between the first customer network and the second customer network through the plurality of intermediate networks using the LSP.

Claim 25 (Previously Presented): The system of claim 24, wherein the border router establishes the LSP by exchanging label information associated with the LSP between the plurality of intermediate networks using a routing protocol.

Claim 26 (Original): The system of claim 25, wherein the routing protocol has been redefined to carry the label information in association with routes advertised between the intermediate networks.

Claim 27 (Original): The system of claim 25, wherein the routing protocol has been redefined to carry the label information as network layer reachability information (NLRI) that is associated with a route advertised between the first customer network and the second customer network.

Claim 28 (Original): The system of claim 25, wherein the routing protocol comprises the Border Gateway Protocol (BGP).

Claim 29 (Original): The system of claim 25, wherein the label information conforms to one of Multi-protocol Label Switching (MPLS) or the Label Distribution Protocol (LDP).

Claim 30 (Canceled)

Claim 31 (Previously Presented): The system of claim 24,
wherein the L2 service information specifies one or more L2 sites or end-points in the second customer network and includes next hop information used to reach these L2 sites or end-points from the first customer network, and
wherein the first and second route reflectors are configured to maintain and relay the next hop information unchanged upon receiving the next hop information via the exterior routing protocol.

Claim 32 (Previously Presented): The system of claim 24, wherein the edge router provides an L2 service that comprises the Virtual Private LAN Service to transport the L2 communications that comprise Ethernet communications and wherein at least one of the plurality of intermediate networks does not support the Virtual Private LAN Service.

Claim 33 (Previously Presented): The system of claim 24, wherein the edge router provides an L2 service by receiving L2 communications from the first customer network, and assigning labels to the L2 communications from the first customer network in accordance with the label information to form packets for transporting the L2 communications from the first customer network to the second customer network through the plurality of intermediate networks via the LSP.

Claim 34 (Currently Amended): A non-transitory computer-readable medium comprising instructions to cause a processor to:

execute a routing process that receives, via a routing communication that conforms to a first routing protocol, label information for a label switched path (LSP) through a plurality of intermediate networks communicatively coupled between a first customer network and a second customer network, ~~wherein the label information is received using the routing process by receiving a routing communication that conforms to a first routing protocol and that includes the label information;~~

receive, over a peering session established with the first routing protocol between the first customer network and the second customer network, layer two (L2) service information comprising MAC address state information for devices in the second customer network;

process, in accordance with the first routing protocol, the L2 service information by injecting the L2 service information into stored route information and resolving the route information to associate routes associated with the injected L2 service information with respective next-hops;

execute a ~~layer two (L2)~~ L2 service that ~~receives~~ processes the L2 service information associated with the second customer network ~~using the first routing protocol, wherein the L2 service information comprises to extract the Media Access Control (MAC) address state information for devices in the second customer network, and wherein the first routing protocol processes the L2 service information by injecting the L2 service information into stored route information and resolving the route information to associate routes associated with the injected L2 service information with respective next hops;~~ and

transport L2 communications between the first customer network and the second customer network through the plurality of intermediate networks in accordance with the MAC

Claim 38 (Currently Amended): A method comprising:

establishing a peering session between a first device associated with a first customer network and a second device associated with a second customer network using a first routing protocol;

establishing a label switched path (LSP) through a plurality of intermediate networks communicatively coupled between the first customer network and the second customer network;

after establishing the peering session and the LSP, ~~communicating layer two (L2) service information over the peering session using the first routing protocol between the first device associated with the first customer network and the second device associated with the second customer network, wherein communicating the L2 service information using the first routing protocol comprises the first device outputting over the peering session a routing communication in accordance with the first routing protocol, wherein the routing communication including includes the layer two (L2) service information, and wherein the L2 service information comprises comprising~~ Media Access Control (MAC) address state information for devices in the first customer network;

processing the L2 service information with the second device using the first routing protocol by injecting the L2 service information into stored route information and resolving the route information to associate routes associated with the injected L2 service information with respective next-hops; and

providing an L2 service in accordance with the L2 service information to transport L2 communications between the first customer network and the second customer network through the plurality of intermediate networks using the LSP.

Claim 39 (Canceled).

Claim 40 (Currently Amended): A system comprising:

a border router that establishes a label switched path (LSP) through a plurality of intermediate networks, wherein the LSP communicatively couples a first customer network and a second customer network;

a first route reflector associated with the first customer network that establishes an Exterior Border Gateway Protocol (EBGP) peering session between the first route reflector and a second route reflector associated with ~~[[a]]~~ the second customer network using the EBGP, and communicates layer two (L2) service information over the EBGP peering session with the second route reflector associated with the second customer network as the L2 service information is learned by ~~continuously~~ outputting EBGP routing communications that include the L2 service information, and wherein the L2 service information comprises Media Access Control (MAC) address state information for devices in the first customer network; and

an edge router that provides a Virtual Private LAN Service to the first customer network in accordance with the L2 service information to emulate L2 connectivity by transporting Ethernet communications between the first customer network and the second customer network through the plurality of intermediate networks using the LSP.

Claim 41 (New): The system of claim 40, wherein at least one of the plurality of intermediate networks does not support the L2 service.